

Department of Metallurgy and Materials Engineering
Indian Institute of Engineering Science & Technology, Shibpur
Howrah - 711 103

Ref.: Tender Advt. No. FE/D(AA)/16/15, Dated February 26, 2016, published in “The Telegraph, Ananda Bazar Patrika (combination) and Sanmarg” Kolkata

Notice Inviting Quotations

Sealed quotations are invited from the bonafide suppliers for the supply of the following equipment as per the given technical specifications. Each equipment will be treated as an individual item. The quotation should reach to the Office of the Head, Department of Metallurgy and Materials Engineering, IEST, Shibpur latest by March 21, 2016, within 16.00 hours.

List of the Equipment

1. General purpose fume hood
2. pH meter
3. Analytical microbalance
4. I-V measurement unit
5. Impedance analyser with probes
6. Infinity Contrast & Colour Corrected Inverted Microscope
7. Inverted Metallurgical Microscope with Digital CCD Camera

TERMS & CONDITIONS AND IMPORTANT INSTRUCTIONS FOR BIDDERS

1. Bidders are to download the tender documents from the Institute website (www.iiests.ac.in). Bidders shall have to submit a non-refundable Tender Application Fee of Rs. 1000/- (Rupees one thousand only) by demand draft drawn in favour of “The Registrar, Indian Institute of Engineering Science and Technology, Shibpur” payable at Kolkata in a separate envelope placed within the main envelope along with a letter containing the bid.
2. Bidders are to submit the tenders in Sealed Cover mentioning the Tender No. and the name of the item at the top of cover in the following address in between 10.30 a.m. to 4.00 p.m. on all working days except Saturdays, Sundays and Holidays:

Head
Department of Metallurgy and Materials Engineering
Indian Institute of Engineering Science and Technology, Shibpur
Howrah-711 103, West Bengal, INDIA

3. A pre-bid meeting will be held on March 7, 2016 at 3.00 pm in the office of Department of Metallurgy and Materials Engineering, IEST, Shibpur. Any modifications based on the pre-bid meeting will be uploaded in the Institute website within the next three working days.
4. The last date and time for receipt of tenders is March 21, 2016 at 4.00 p.m. Tenders received later will not be entertained under any circumstances.
5. All bids should be submitted in TWO-BID Format in separately sealed covers. The contents of the envelope (Technical Bid / Price Bid) should be mentioned on its top. All the sealed envelopes should be placed in a common sealed envelope, superscripted with the Ref. Advertisement No. and date and item no and its name along with the bidders name and address.
 - (i) PART I: TECHNICAL BID - giving Detailed Specifications, International Standards, Catalogues, List of users & Technical Details / Operating Parameters, Pre-Installation Requirements, Warranty etc.
 - (ii) PART II: PRICE BID - giving full Prices in Indian Rupees and/or in single Foreign currency for processing of order. Transshipment is allowed. Total price will be inclusive of all applicable duties, taxes, insurance (if any), other charges etc. in Indian Rupees on the basis of supply at IEST, Shibpur and /or in case of Foreign currency, on the basis of

- (a) CIF at Kolkata Airport, Freight, Insurance charges should be clearly indicated as well as (b) Cost and Insurance, Freight collected to Kolkata Airport.

In addition of the above, price of optional accessories, spares and consumables along with AMC offer as well as any other items/parts/spares recommendation by the vendor should be quoted separately.

The date and time of opening of bids (Technical bid only) is March 21, 2016 at 5.00 p.m. and the place of opening of bids is the office of the Department of Metallurgy and Materials Engineering, Indian Institute of Engineering Science and Technology, Shibpur, Howrah-711 103. Vendors successful in Technical bid will be informed about the opening date and time of the Price bid.

6. Bid Prices

6.1 The Bidder shall indicate the unit price and total bid prices of the goods it proposes to supply under the contract appropriately.

6.2 Prices indicated on the price-schedule form shall be entered separately in the following manner:

(a) For Goods manufactured within India

- (i) The price of the goods quoted Ex-works including taxes already paid.
- (ii) VAT and other taxes like excise duty etc. which will be payable on the goods if the contract is awarded.
- (b) The charges for inland transportation, insurance and other local services required for delivering the goods at the desired destination as specified in the price schedule form.
- (c) The installation, commissioning and training charges including incidental services, if any.

(b) For Goods manufactured abroad

- (i) The price of the goods, quoted on (a) CIF (Kolkata Airport) as well as (b) Cost and Insurance, Freight collected to Kolkata Airport basis.
- (ii) The agency commission charges, if any.
- (iii) The installation, commissioning and training charges including incidental services, if any.

6.3 The terms FOR, FOB, FCA, CIF, CIP etc shall be governed by the rules prescribed in the current edition of the Inco terms published by the International Chambers of Commerce, Paris.

6.4 For Goods manufactured abroad, without (a) CIF (Kolkata Airport) as well as (b) Cost and Insurance, Freight collected to Kolkata Airport, pricing offer shall be rejected as incomplete.

6.5 The price quoted shall remain fixed during the contract period and shall not vary on any account.

6.6 All lots and items must be listed and priced separately in the Price Schedules. If a Price Schedule shows items listed but not priced, their prices shall be assumed to be included in the prices of other items. Lots or items not listed in the Price Schedule shall be assumed to be not included in the bid.

7. Earnest Money Deposit:

7.1 Earnest money deposit @ 2% of the price quoted in the form of Bank Guarantee from any nationalized bank / Demand Draft / Pay Order drawn in favour of the Registrar, IEST, Shibpur and payable at Kolkata shall have to be paid by the successful bidder before collecting the work order.

7.2 Tender has to be kept valid for acceptance for a minimum period of 6 months without any modifications in its terms and conditions.

7.3 Earnest money deposit will be refunded after successful completion of installation or after expiry of warranty/Guarantee period, whichever is earlier. No interest is payable on Earnest Money Deposit/ Security Deposit.

8. Supply of the equipment:

8.1 The supply of the equipment should be completed within a period not exceeding 3 months from the placement of the formal work order or not exceeding 2 months after opening of the LC/wire transfer for foreign items. If the supply is not completed within the mentioned period, a Liquidated Damage @ 0.5 per cent per week will be imposed subject to maximum of 5% of the value of work order.

8.2 The equipment are to be supplied at Department of Metallurgy and Materials Engineering, IEST, Shibpur between 11.00 a.m. and 4.00 p.m. on working days except Saturday, Sundays and holidays. The tenderer will be responsible for any breakage, damage or defect in the equipment detected subsequently. For goods manufactured abroad, Cost and Insurance should be from ware house to ware house.

8.3 Materials & Accessories supplied should be as per specification and finally approved by any authorised Officer of the IEST, Shibpur, Howrah.

8.4 Supply of equipment shall include installation, erection, commissioning and demonstration. These will be the sole responsibility of the Supplier/Indian Agent.

9. Customs Duty & Excise Duty

9.1 The Institute will not issue any C or D form for availing of concessional Sales Tax/ VAT.

9.2 The Institute will issue Customs Duty Exemption Certificate or Excise Duty Exemption Certificate for foreign purchase, if required.

10. (a) For Indian purchase (This clause is applicable only for Indian purchase and not applicable for foreign purchase): Bills in triplicate should be presented for payment within 30 days of Supply / Completion of work. No Advance Payment can be made. All bills are to be accompanied by Order copies and Challan Receipt (triplicate). The Order Number is to be quoted on both the Challan and the Bill.

Or

(b) For Foreign purchase (This clause is applicable only for foreign purchase and not applicable for Indian purchase): Payment will be made through Letter of Credit/Wire Transfer. AWB, Packing list with dimension, Warranty certificate, a declaration stating the package (s) contain no hazardous materials etc should be provided.

Note: All payments are subjected to statutory deductions as and when applicable.

11. Documents to be submitted with the tender:

11.1 Tender Documents/Terms & Conditions in Original to be duly signed by the Proprietor / Partner/ Director of the Company as a token of acceptance of Terms & Conditions of Tender.

11.2 Latest Income Tax, Sales Tax, Professional Tax Clearance Certificates and copy of Valid Trade License. (This clause is applicable only for Indian supplier and not applicable for foreign Purchase).

11.3 Technical bid, Price bid separately in two sealed envelope according to specifications.

11.4 Non-refundable processing fee of Rs. 500/- for each item in the form of Demand draft.

12. Payment, warranty and responsibility

12.1 In case of foreign purchase, LC/wire transfer will be confirmed at the suppliers cost, if requested specifically by the supplier. All bank charges in abroad shall be to the account of the beneficiary i.e., supplier and all bank charges in India shall be to the account of the opener i.e., purchaser. If LC/wire transfer is requested to be extended / reinstated for reasons not attributable to the purchaser, the charges thereof would be to the suppliers' account.

12.2 Warranty/guarantee for all the items of equipment/system supplied shall be on 'all comprehensive' basis (i.e., including repairs, replacements, maintenance, etc.) for at least thirty-six (36) months from the date of the commissioning of the equipment. Calibration/Test Certificate must accompany along with the equipment, if needed.

13. Evaluation and comparison of bids

13.1 To evaluate a Bid, the Purchaser shall only use all the factors, methodologies and criteria defined as under:

For goods manufactured in India

- (i) The price of the goods quoted ex-works including all taxes already paid.
- (ii) VAT and other taxes like excise duty etc. which will be payable on the goods if the contract is awarded.
- (iii) Charges for inland transportation, insurance and other local services required for delivering the goods at the desired destination.
- (iv) The installation, commissioning and training charges including incidental services, if any.

For goods manufactured abroad

- (i) The price of the goods, quoted on (a) CIF (Kolkata Airport) as well as (b) Cost and Insurance, Freight collected to Kolkata Airport basis.
- (ii) The agency commission etc., if any.
- (iii) The installation, commissioning and training charges including incidental services, if any.

13.2 The comparison of price bid will be on the following basis:

- (i) For goods manufactured abroad, (a) CIF price value plus other charges which includes the taxes and duties as applicable and service charge, delivery charges etc. in actual; as well as (b) Cost and Insurance, Freight collected to Kolkata Airport plus other charges which includes the taxes and duties as applicable and service charge, delivery charges etc. in actual.
- (ii) For goods manufactured in other states in India ex-factory plus applicable taxes plus 2% as incidental charges.
- (iii) For goods manufactured in West Bengal quoted price plus applicable taxes.

Item No. 1: Fume Hood (General Purpose)

Specification:

Sl. No.	Details of specifications	
1.	Desired Dimensions	<p>Overall dimensions of Fume hood with base cabinet: 2400 mm H × 1800 mm W × 1000 mm D</p> <p>Fume Hood dimensions: 1500 mm H × 1800 mm W × 1000 mm D</p> <p>Base Cabinet dimensions: 700 mm H × 1800 mm W × 700 mm D</p> <p>Inside Fume Hood working volume: 1155 mm H × 1520 mm W × 750 mm D</p> <p>Bed size: 1520 mm W × 750 mm D</p> <p>Height of worktop from ground level: 850 mm</p>
2.	Design of structure	<p>Floor mounted, automatic bypass type and aerodynamic.</p> <p>Airflow Type: Automatic By-Pass.</p> <p>Preferable Design Basis: The design of the fume hood should be tested as per EUROPEAN NORMS EN 14175 and also comply with ASHRAE 110/1995.</p>
3.	Construction (Exterior)	<p>A rigid structure made of heavy duty GI (As per IS: 513) with a minimum thickness of 1.0 mm.</p> <p>Materials should be highly chemical resistant, such as Polyurethane Powder/Epoxy coated; corrosion and scratch resistant and durable.</p> <p>Front top panel should be easily openable and hinged for easy access to flow control valve and electrical lighting fixtures for maintenance.</p> <p>Preferably having Triangular Profiled Corner Post made of highly chemical resistant Epoxy/Polyurethane Powder coated, durable and made of heavy duty GI sheet with a minimum thickness of 1.5 mm. It should be placed on Left and Right Hand Side of the Fume hood and should house the utility line fittings and electrical receptacles.</p>
4.	Construction (Interior)	<p>The interior should be highly chemical & heat resistant, fire retardant, smooth finish and easily cleanable panels. Made out of durable material integral work walls with a minimum thickness of 6 mm. ASTM flame spread index < 25 (preferable).</p>
5.	Worktop	<p>Chemical resistant, high scratch and wear resistant. Jet black granite of minimum 18 mm thickness.</p> <p>Should be easily cleanable and splash and spillage proof.</p>
6.	Baffle arrangement	<p>Exhaust of light, normal and heavy fumes should be smooth and immediate.</p> <p>It should have an interstitial three point suction system (for</p>

		light, normal & heavy fumes) with baffle.
7.	Airfoil	Aerodynamic Design, Horizontal airfoil mounted on the worktop and should be preferably made of SS 316L (1.2 mm).
8.	Sash (Shutter)	Should be vertical rising type, counter balanced and easy to operate. Should be made of 4 mm (min) thick toughened float glass. Upper panels should be provided for bypass and lower panels for airfoil. The full view panel should be provided for full work visibility and should be made of fixed toughened glass. Sash stops should resist opening up to safe opening height. The clear openable height should be minimum 700 mm.
9.	Sink, Water tap with drain arrangement	Worktop should have an epoxy cup sink (100 mm × 200 mm) for drainage with water tap on both sides of worktop with flexible drain pipe up to 1 m long. Material for sink construction should be chemical resistant.
10.	Wet & Dry Service fittings	Colour coded remotely operated service valves for fine control as per DIN 12920 norms. Total 4 nos. service valves with PU plumbing that can withstand up to 15 kgf pressure and brass fittings should be provided. 1 for Nitrogen 1 for Vacuum 1 for Compressed Air 1 for Raw Water line above one sink Fittings should be located on left of fume hood in separate media columns. Utility line taps should be staggered in the fume hood to avoid the intermingling of the flexible tubes. Taps should be tapered to use with flexible tubing. Removable access panel for easy servicing of utility lines.
11.	Electrical Utilities	LED light (02 nos) with suitable corrosion resistant enclosure, and vapor-proof fitting for good illumination. Fume hood should have four electrical sockets and switches of 230 V, 5/15 A, and 50 Hz. Four MCB's with blower NO/NC switch (with built in starter). Cables & wires should be 'Fire Retardant' grade. LED to indicate ON/OFF position of switches. Soft touch button panel for main switch, separate switches for blower and light and one spare switch. A single phase DP switch for entire power supply. A cable entering port for access of cables from fume hood to electrical sockets
12. *	Apparatus Storage Base Cabinet	Base cabinet should be ready to receive the fume hood at its top. It should have the following features: Complete powder coated, rigid structure to support Fume hood. One removable horizontal partition to store chemicals.

		<p>Double skin hinged doors with chemical resistant hinges and hassle free operations in the corrosive lab atmosphere.</p> <p>The storage units should be connected to upper duct to exhaust inner fumes of cabinet.</p> <p>Fully openable back panels for service line access.</p>
13. *	Chemical Storage Cabinet Base	<p>Base cabinet should receive the fume hood at its top with the following features:</p> <p>Internal special chemical resistant material lining to the cabinet walls</p> <p>Two exhaust ports connected to the fume hood exhaust system internally.</p> <p>Complete powder coated, rigid structure to support Fume hood.</p> <p>One removable horizontal Shelve (Two Horizontal Portions) to store chemicals.</p> <p>Double skin hinged doors with chemical resistant hinges and hassle free operations in the corrosive lab atmosphere.</p> <p>PP Trays for chemical storage</p> <p>Fully openable back panels for service line access</p> <p>Locking System for the Base Cabinet doors</p>
14.	Leveling Screws	To adjust fume hood level by ± 10 mm.
15.	Exhaust Port	<p>Design should ensure that the fumes will be exhausted smoothly.</p> <p>Flow control valve to regulate airflow</p>
16.	Centrifugal Blower	<p>Silent high efficiency remote blower.</p> <p>Continuous rating motor with an aerodynamically balanced chemically resistant impeller.</p> <p>Face velocity of blower - 80 to 120 ft/min as per ANSI at safe working height.</p> <p>The casting should be made of PP + FRP.</p> <p>A drain plug must be provided.</p> <p>The suction should be minimum 750 CFM as per fume hood pattern which should follow international safe velocity norms.</p> <p>3 phase 1.0 HP Motor, direct or belt driven with continuous rating should be provided as per IS 325.</p>
17.	Ducting	<p>A rigid and flexible ducting has to be provided from fume hood to exhaust stack point with weatherproof canopy.</p> <p>It should be made of chemical resistant PP + FRP.</p> <p>Horizontal and vertical members, flanges, bracketed supports, gooseneck exhaust stack and bends have to be provided for the total ducting system.</p> <p>The joints should be flexible in order to provide transmission of blower vibrations to the hood.</p>
18.	Optional items	<p>Apparatus Holding Grid: Preferably made of Duralumin rod, to hold the apparatus, to cover the entire length of the fume hood and built-in at the back side of fume hood.</p> <p>Air Flow Monitor</p>

		An air flow monitor to indicate the approximate face velocity of airflow with red and green LEDs corresponding to low and normal flow rates. Temperature Indicator Having a display within a range of (-199 to 400°C)
19.	Warranty	Minimum three years from the date of installation.

*Serial No. 12 and 13 to be quoted separately.

INSTALLATION

Installation should be carried out by the supplier with ductwork design, fitting, fixing of blower, commissioning and testing of the same.

Certificates of coating standards, material of construction, lamination quality and any other applicable quality requirements should be produced.

The bidders should also include the following in their bids:

1. All civil works related to ducting root, blower foundations - Provision for Blower foundation (RCC) or Platform (MS structure), flooring for fume hood etc.
2. All the related electrical and plumbing work, which is outside of the fume hood and electrical connections from source to fume hood and from fume hood to blower.

Item No. 2: pH meter

Specifications

Sl No.	Description	Details
1.	pH range	0.000 to 14.999 pH
2.	mV range	0.00 to 1999.9 mV
3.	Temperature range	0° to 100 °C
4.	pH resolution and accuracy	0.001 and +/- 0.002 pH
5.	mV resolution and accuracy	0.1 mV and +/-0.2 mV
6.	Temperature resolution and accuracy	0.1° and +/-0.2 °C
7.	Calibration system	Minimum three points
8.	Communication	RS-232 for printing purposes
9.	Operating Temperature	5° to 45°C
10.	Display	Custom LCD
11.	Warranty	Three years

Item no. 3: Analytical Micro-balance

Specifications

Sl no.	Description	Details
1.	Weighing capacity	120 to 150 gm
2.	Readability	≤ 0.01 mg
3.	Adjustment	isoCAL Standard weight for balance calibration is to be supplied
4.	Operation	key
5.	Display	High Resolution Touch Screen Display
6.	Leveling	Assisted
7.	Pan size	80×80 mm ² (minimum)
8.	Optional interfaces	RS-232 25- pin/Bluetooth/RS-232 9- pin, incl. PS/2 port
9.	Warranty	Minimum three years from the date of installation.

Item No. 4: I-V Measurement Set Up With Probes

To determine current-voltage characteristics of semiconductor devices, thin films, nano device structures, high dielectric materials and other material samples with provision for two and three terminal devices characterization.

Specifications:

Integrated I-V characterizations system for characterization of different material samples. Real-time plotting and analysis with high precision and resolution, while remaining highly integrable, flexible, upgradable and user-friendly. The equipment must be computer controlled having full automation features with parameter extraction software.

1. Operating Power Supply & Frequency: 220V, 50Hz
2. Interfaces: GPIB, USB and LAN Test Fixture: The system must accompany all the required test fixtures for measurement of various types of nano-structured materials.
3. Operating Systems: MS Windows, and /or Linux (latest version)
4. Software: The system must include the software for automatic I-V parameter extraction from the measured characteristics.
5. Function: System should be capable of measuring and sourcing voltage or current.
6. Voltage capability: ± 20 volts with resolution of 100 nV or better for measurement and minimum 10 μ V or better for sourcing
7. Current capability: ± 3 A DC and 10 A pulses with resolution of 100 fA or better for measurement and minimum 10 pA or better for sourcing
8. Power: System should have 1A@ 40V i.e. 40W capability on every channel or better. In pulse mode the system should be able to provide 5A@35V or better
9. Internal Memory: Desirable 16 MB or better internal memory for stand-alone operation
10. Software: Should be capable of functions like voltage/current sweep/ steps. Should be able to store the data and graphs and more.
11. Warranty: Minimum three years from the date of installation.

Optional requirements:

Up gradation: System should have capability to upgrade to more multiple source measuring units (SMUs) in one system for future expansion.

Probe station: A probe station, with ultra-sharp probes, compatible with the system that can be adjusted in x, y and z directions and can measure I-V by varying positions along the 3 directions. The probe station should also allow to measure temperature dependent I-V by placing the sample in high vacuum cryo system.

Item No. 05: Impedance Analyzer with Probes

To determine impedance characteristics of semiconductor devices, thin films, nano device structures, high dielectric materials and other material samples.

Specifications:

Impedance characterization system for characterization of different material samples. Real-time plotting and analysis with high precision and resolution, while remaining highly integrable, flexible, upgradable and user-friendly. The equipment must be computer controlled having full automation features with parameter extraction software.

1. Operating Power Supply & Frequency: 220V, 50Hz
2. Interfaces: GPIB, USB and LAN Test Fixture: The system must accompany all the required test fixtures for measurement of various types of materials.
3. Operating Systems: MS Windows, and /or Linux (Latest version)
4. Software: The system must include the software for automatic Impedance parameter extraction from the measured characteristics. Should be capable of functions like voltage and frequency sweep/steps. Should able to store the data and graphs and more.
5. Frequency range: 50 Hz to 10 MHz or better.
6. Impedance measurement accuracy: ± 0.01 to ± 0.1 %
7. Impedance measurement range: 30 m Ω to 40 M Ω or better.
8. Measurement parameters: $|Z|$, $|Y|$, θ , R, X, G, B, L, C, D, Q, Complex Z, Complex Y.
9. Built-in DC bias range: 0 V to ± 40 V, 0 A to ± 100 mA or better.
10. Warranty: Minimum three years from the date of installation.

Optional requirements:

Up gradation: System should have capability to upgrade to wider frequency range.

Probe station: A probe station, with ultra-sharp probes, compatible with the system that can be adjusted in x, y and z directions and can measure Impedance and Capacitance-Voltage by varying positions along the 3 directions, should also be quoted as an optional item.

Item No. 06: Infinity contrast & color corrected Inverted microscope

Specification

S.No.	Feature	Descriptions of requirement
1.	Microscope stand	Manual with camera attachment, providing wider work surface. Intensity control shall be frame mounted. Coaxial coarse and fine focus controls along with one Super fine focus finger touch knob.
2.	Optics	The optics of the microscope should be corrected for spherical and chromatic aberration. It shall incorporate infinity contrast and color corrected optical system.
3.	Aperture & Field diaphragms	Individually adjustable for reflected illumination.
4.	Focus control	Coarse and Fine focus knob should be provided on each side of the frame with finger touch button for re-adjustment facility during Fine Focus.
5.	Observation tube	Wide field Binocular tube with tube inclination 30 degree or 45 degree two position light path selector Eyepiece/Camera port. Interpupillary distance adjustment from 50 to 75 mm (minimum). Provision for ergonomic viewing is optional requirement.
6.	Illumination	Vertical Reflected light Illuminator with 12V 100W Halogen bulb / LED bulb, Cooling Filter & Condensing Cone. External Key should be provided to align the illuminator.
7.	Filters	Minimum with three position filter holder for reflected illuminator along with different filters. Necessary filters for light balancing and cooling should be provided with the system.
8.	Auto darken facility	The Illuminator should have Auto Switch Off option, to have a longer life of illumination source.
9.	Polarizer & Analyzer	Reflector Polarizer module & Analyzer Slider should be incorporated.
10.	Contrast methods	Reflected light: Bright field, dark field, DIC-Vendor must quote in standard requirement. C-DIC, fluorescence, polarization. Transmitted light: Bright field, polarization. Provision of upgradation with TIC (Total Interference Contrast).
11.	Reflector Turret	Minimum: 4x reflector turret for Push and Click reflector modules.
12.	Sample	Universal, coaxial right handle ceramic coated stage, 40 x 40 mm

	work stage	(Min.) having stage plate of variable diameter. Scanning stage: 120 mm × 80mm (min)
13.	Nosepiece	5x encoded nosepiece turret to recognize the change of objectives automatically.
14.	Objectives	Parfocal plan Aberration corrected objectives 5x, 10x, 20x, 50x, 100x for Reflected Mat. bright field and dark field observation.
15.	Eyepieces	Wide field Eyepieces 10x and shall accept eyepiece micrometer.
16.	Camera Port	Dual, Front / Side/Top ports with 2 switching positions. Compatible port to Connect Microscope directly with the PC to Integrate the System.
17.	Scientific Digital CCD Camera	Microscopic color & Monochrome Digital Camera with minimum 2560 x 1920 Pixels (5 MP) Chip resolution, live image display with CMOS sensor. Chip size 1/2.5" (minimum), pixel size 2.20 X 2.20 μm (min.). Should transfer live image via LAN, exposure time 10 micro sec. to 2 sec. (min.). Frame transfer rate 8 frames/Sec. or higher @ max. resolution, Normal 24 frames/Sec (min.). Automatic White balance along with automatic intensity control.
18.	PC	High end configuration of desktop (core i5 processor, 8GB RAM, 1TB hard disk, 18.5 inch color monitor, optical DVD writer) compatible with windows 8.1 operating system or higher.
19.	Image Analysis Software	Future provision for efficient image processing and analysis software for quantifying and evaluating the microscopic images to be compatible with the operating system.
20.	Warranty	Minimum 3 years from the date of installation.

Item No. 07: Inverted Metallurgical Microscope with Digital CCD camera

Specification

Sl. No.	Feature	Descriptions of requirement
1.	Microscope stand	Inverted and Illuminator intensity control shall be frame mounted.
2.	Optics	Microscope optics should be apochromatically corrected from the source.
3.	Aperture & Field diaphragms	Manually operated appropriate Aperture & Field diaphragms with lever slider.
4.	Focus control	Manually driven Coarse and Fine focus. Coarse revolution: 2 mm, and Fine revolution: 0.2 mm. (max.)
5.	Observation tube	Wide field Binocular tube with manual Shutter for adjustment 100% / 0% and interpupillary distance from 50 to 80 mm Variable, Tilt angle 45°, providing Upright Images. Provision for ergonomic viewing (optional requirement).
6.	Illumination	12V-100W long life LED Lamp/Halogen Lamp with necessary arrangement for Homogeneous illumination. External lamp filament alignment facility for proper Optical axis adjustment.
7.	Auto darken facility	The Illuminator should have Auto Switch Off option, to have a longer life of Illumination source.
8.	Observation technique	Bright Field, Dark Field, Polarizing – Analyzing, DIC should be incorporated. Provision of Up-gradation with Circular DIC & TIC (Total Interference Contrast).
9.	Reflector Turret	6 Position turret for accommodating Six Reflector Modules for different Observation Techniques.
10.	Sample work stage	Min: 120 mm x 80 mm with x-y motion control lever for smooth movement and variable stage aperture.
11.	Nosepiece	Bright Field-Dark Field-DIC Sextuple (6 fold) Revolving Nosepiece with Polarising-Analysing observation. Individual slots for inserting Nomarski DIC prism.
12.	Objectives	High resolution light Universal Objectives 5x, 10x, 20x, 50x, & 100x.
13.	Eyepieces	Plan wide field focusable 10x Eyepieces with Diopter control facility.
14.	Camera Port	Dual, Front / Side ports with 2 switching positions
15.	Digital CCD camera	Microscopic Color & Monochrome Scientific Digital Scanning Camera. Resolution: Minimum 5.0 MP. Pixel Size: 3.45 µm x 3.45 µm (Minimum). Live image display through PC @5.0 (minimum) MP Resolution. Transfer of live image via LAN. Exposure Time: 1 micro sec. up to 4 sec. Frame Transfer Rate: 24 fps (minimum) and 8 fps (or higher) at highest resolution. Suitable PC

		Interface. ROI- Adjustable. Automatic calibration facility. C-Mount Camera Adapter. The Microscope & Camera functions should be controlled from PC through Analysis Software.
16.	PC	High end configuration of desktop (core i5 processor, 8GB RAM, 1TB hard disk, 18.5 inch colour monitor, optical DVD writer) compatible with windows 8.1 operating system or higher.
17.	Image Analysis Software	Future provision should be available from the maker to provide interactive, efficient and user friendly Image Analysis software compatible with Windows 8.1 and higher version.
18.	Warranty	Minimum 3 years from the date of installation.